NINGBO: A REGIONAL CITY LEAPFROG INTO HI-TECH DEVELOPMENT

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Summary
The dynamic development in Ningbo illustrates local changes that have their basis in government support and resources from all levels of government. The rapid development arises from a combination of excellent infrastructure, a strong private entrepreneurship and strong foreign direct Investment (FDI) to exploit the geographical location which will be further enhanced when the bridge, across Hangzhou Bay to Shanghai, is completed by 2008.

Ningbo, a famous port city in China, reached in 2000 a population of six million. It is situated 100 kilometres from Hangzhou, the capital of Zhejiang province, and 150 kilometres across the water from Shanghai. In terms of geo-economics Ningbo is an integral part of the dynamic Yangtze Delta region; but Ningbo is also trying to develop its own niche based on its comparative advantage. This is an important feature of China's regional development model.

Ningbo is the native place of Ningbo Bird, the forerunner in China's, as well as a strong contender in the global, mobile handset industry. Ningbo has traditionally been a location for car component industries with early development of spark plugs and car wheels. The Geely car company has used Ningbo for its national expansion The Ningbo car components industry is expanding fuelled by support from the mould industry and a number of private supplier entrepreneurs. There are three major moulding industry centres in China. The moulding industry in Ningbo now employs about 100,000 workers.

Ningbo does not want to remain only in knowledge application but in knowledge creation too. To this end Ningbo has four national-scale development zones, one hi-tech zone and 10 provincial and municipal level development zones which cater to both shipping and trade sectors; it is widely using incubators to stimulate new technologies. The Ningbo Hi-Tech Park is an important hi-tech zone in the region. jointly developed by the Chinese Academy of Sciences and the Ningbo Municipal Government, it was opened in July 1999. In March 2004, the Chinese Ministry of Education approved the establishment of Ningbo-Nottingham China's first Sino-foreign university. The new university will be founded jointly by the University of Nottingham of Britain and the Zhejiang Wanli University in Ningbo with an investment of RMB600 million.

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Keywords
Regional innovation system, local universities, industrial parks, incubators, clusters, industrial zones

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1. Ningbo position[1]

Many of the cities in China's coastal areas, like Hangzhou, Suzhou and Wuxi, are all pursuing their export-oriented development strategies and enjoying the external economies of the region as a whole. At the same time, each city also devises its own development plans to compete for more MNCs and more DFI. Thus, forces of competition and a complementation are working hand in hand with Ningbo providing an excellent example of a regional development that shares many characteristics of city development in the Pearl River Delta region.

Ningbo is gradually losing the status of being a preferred location in labor-intensive manufacturing. Development in Ningbo is based on two pillars. One is the natural advantage of geographical location and excellent port conditions which are constantly upgraded through logistics and other related services. This has attracted large-scale investments from overseas as well as Chinese firms in energy, petrochemical, paper, and cereal processing industries.

[1] Material and insights contained in this brief were collected during a study a visit during September 20-25 2004. I am very grateful to Mr Wu Hemin, Vice-Mayor of Ningbo City, for his invitation. My study was greatly facilitated by Mr Shen Yiben of the Ningbo Foreign Trade & Economic Cooperation Bureau, and officials in various departments who unfailingly organized my visits throughout the week, and subsequently provided detailed information about education and R&D in the City. Finally, I want to express my sincere thanks to Professor John Wong who invited me to the East Asian Institute as Visiting Senior Research Fellow and constantly providing useful comments for preparing my collected material.

The other pillar is a man-made comparative advantage that has gradually evolved in precision machinery such as moulding equipment and an advanced capability in the making of moulds. Close relations with Shanghai has also stimulated local entrepreneurs to serve the booming automobile industry's demand for various car components. An increasing use of electronics in machinery and car component industry has contributed to the development of the electronics industry in Ningbo.

The industrial dynamics of structural change has been well understood by municipal and provincial planners who in a timely fashion have expanded college education. See appendix 1. In meeting the demand for high-level talents the authorities in Ningbo are also "head-hunting" in the less developed provinces in the Northeast and the West of China where a number of good national universities are operating. Furthermore, Ningbo is in various ways increasing the attractiveness of the city by creating centres for arts and cultural activities as well as a theme park.

The combination of local entrepreneurship and agility of planners to grasp new possibilities provide clues why China's most successful mobile handset maker and one of the country's two private car companies have their roots in Ningbo. Not resting on its laurels Ningbo has declared its ambitions to further develop its high technology sectors such as new materials and pharmaceutical industry. To this end a pharmaceutical college has been established and Ningbo looks forward to pharmaceutical companies locating themselves in the city.

Ningbo sees its future potential shifting towards hi-tech industries such as micro-electronics, software and telecommunications. The high-tech parks, industrial parks and incubators are geared towards a shifting industrial structure. The expansion of higher education and the creation of R&D infrastructure are other measures being mobilized to make Ningbo into a future Knowledge City.

Ningbo Municipality south of Shanghai is the native place of Ningbo Bird, China's forerunner in its local mobile handset industry, and a strong contender in the global mobile handset industry. Ningbo is also home to the Geely Group, a private company that has, during the past couple of years, entered the car industry in a major way. The group is also the founder of the Geely University in Zhongguancun, Beijing. Ningbo has also fostered the first "market-economy" university – Zhejiang Wanli University (ZWU) – and the first full-campus international university in China in autumn 2004 – Ningbo-Nottingham University. These and other initiatives have their roots in Ningbo's special characteristics which include a strong support for private initiatives and institutional innovations, partly guided by central authorities.

Ningbo has enjoyed favourable conditions for economic development having been one of the early "open" cities in China's reform strategy after 1978. It covers an area of 10,000 square kilometres and has a population of 6 million. Ningbo port has become one of the important ports in China. Its cargo handling capacity reached 185 million tonnages in 2003, ranking second among the ports in mainland China. GDP reached RMB177 billion in 2003 with GDP per capita considerably above 3000 dollars. The jurisdiction of Ningbo

City encompasses two counties - Xiangshan and Ninghai - and three county-level cities - Yuyao, Cixi and Fenghua - and six urban districts - Haishu, Jiangdong, Jiangbei, Zhenhai, Beilun and Yinzhou. Almost all of these administrative units have industrial parks and most of them have also established incubators. See appendix.

A number of clusters are port-based such as the petrochemical, iron and steel, and paper industries. The geographical character of Hangzhou Bay has favoured traditional industries such as the automobile sector, home appliances and garments industries. Future technological development will take advantage of Ningbo's geographical and structural characteristics. Port development will result in higher value-added, more down-stream products. The petrochemical industry will also expand into higher valued-added products and similar developments will take place within the iron and steel industry that will develop specialized stainless steel products.

The IT sector, considering the above is supposed to become important and evolve from an earlier concentration of computer motherboards. Ningbo city has an agreement with the Chinese Academy of Sciences (CAS) to support Zhejiang University with a Network Technology Institute which will be located inside the High-tech Park. See appendix for a complete list of high-tech parks and industrial zones in Ningbo.

Ningbo has traditionally been a location for car component industry with an early development of spark plugs and car wheels. Metal moulding that used to be very strong is now expanding into new product areas while the moulding industry has strengthened and thus attracted investments from Hong Kong and overseas. There are two other moulding industry centres in China. One is Shenzhen which has its focus on die-casting for electronics. The second is Taichu, Zhejiang, which is strong in plastics.

Ningbo has become strong in moulding partly through a transfer of activities from Shanghai for plastic and die-metal moulding. See appendix for details of selected mould-making companies. The moulding industry in Ningbo now employs about 100,000 workers. This rapid development has taken place since 1978 driven by three major factors. First, an expansion in Shanghai very soon affected Ningbo in a major way by forcing an industrial restructuring. Second, the private industry has played a pivotal role. Third, a rapidly expanding demand from Japan, Germany and Taiwan has fostered a local development of the moulding industry. Furthermore, machinery for plastics moulding developed at early stage. The large household group Haier has been buying many mould components in Ningbo, as it is able to deliver moulds for products that weigh only a few milligrams to pieces as large as 50 kilograms. Mutual relations have developed between Ningbo companies and counterparts overseas. The car components industry is expanding fuelled by support from the mould industry and a number of private entrepreneurs. Other centres for car components exist in Shanghai and in Tianjin.

2. Higher Education in Ningbo

Ningbo offers an interesting example of China's expansion in higher education. The recent annual enrolment is roughly 30% of a cohort while the national average has reached 20%. The majority of this expansion has taken place in various types of professional colleges. See appendix.

Ningbo requires qualified personnel from other parts of China and organizes Talents Fairs on an annual basis in Northeast China. Experienced graduates in that part of China would get an annual salary in the region of RMB12,000-18,000, while they would earn considerably more in Ningbo. However a number of initiatives are in a major way changing the higher education sector in Ningbo, which already has 15 institutions with Ningbo University playing a major role. ZWU provides an innovative approach in terms of education, and with an ambition to establish strong partnerships with recognized foreign universities.

ZWU is created on the basis of restructuring a former provincial institution of higher learning - the Zhejiang Junior College of Training Teachers for Agricultural Technology established in the early 1950s. ZWU is supervised by the Zhejiang Education Department and is operated by the Zhejiang Wanli Education Group (ZWEG). ZWU has two campuses – Huilong and Qianhu. The Junior College of the university is located in the Huilong campus, "where the management of freshmen is paramilitarised".[2]

ZWU has a Junior College, the College of Commerce, and departments such as foreign languages, law, culture and media, artistic designing, computer, electronic information engineering, and life sciences with altogether 38 specialties in junior college programs. It is offering eight specialties in undergraduate programs. ZWU has three research institutes - Institute of Culture, Institute of Biological Technology, and Ningbo Industrial and Economic Development Research Centre.

The number of full-time students was more than 8,000 in 2003 and an Adult Education Program had more than 1,000 students. ZWU has seven laboratory centres and three municipal key laboratories – with installed laboratory equipment in the amount of RMB45 million. The University gives much attention to research and national science endeavour as well as economics and management issues. It also encourages staff to look for new models in China's economic development.

ZWU is so far the only market-economy university in China. Though it is a private university, the land and buildings belong to the local government in Ningbo. It follows the university regulations established by the Ministry of Education. However, ZWU receives no support for its teaching activities which have to be covered from much higher tuition fees than those levied by nationally-supported universities. The student fees at Fudan University in Shanghai are around RMB4,000 per year while ZWU charges its students RMB16,000.

[2] Zhejiang Wanli University brochure, 2003 states that the Huilong campus conducts "paramilitarised administration to students by strictly regulating their behaviour while stimulating their study potentials".

ZWU started with 1,200 students in a three-year program. It has now reached total enrolment of 16,000, 10,000 of which are studying for 4-year university degrees while the rest are studying in its 3-year diploma programs. The planned intake is more than 4,000 students in 4-year programs and another 1,000 in diploma programs. Total enrolment will stabilize around 20,000 towards the end of the decade.

Creating a new style university like ZWU has its origin in the reform policy of the Ministry of Education that has encouraged experimental models as society desired more higher education, with a blossoming demand in Eastern China. However, private universities have in the past only offered diploma training. ZWU is in the forefront of private universities to offer a full range of 4-year programs for university degrees.

Professor Min Ying, Vice-President of ZWU, argues strongly that ZWU-type universities will increase – under the supervision and quality control of the Ministry of Education, and provincial-level authorities. These universities will operate as "market-economy" universities, to cover a high percentage of costs through tuition. They will not pursue "industrialized education" and will not operate for profits. Private universities will increasingly expand and many have direct links with the public sector like ZWU. They will focus on training and serving society. Students in ZWU mainly come from Zhejiang province.

ZWU is actively soliciting funds for its laboratories and research activities and is exploring ways to collaborate with firms. An important objective is to train students and staff. The University is involved in a major project to establish the Nottingham-Ningbo University on a new campus, which is presently under construction. The Chinese Ministry of Education approved in March 2004 the establishment of Nottingham-Ningbo University as China's first Sino-foreign university[3]. The new university will be founded jointly by the University of Nottingham of Britain and the ZWU at an investment of RMB600 million. The University of Nottingham revealed that the cost of the venture will be covered by fees from students at the new university - and that any surpluses will be re-invested[4].

Professor Min Ying sees the new university as a step towards globalization of higher education in China. An important objective is to make students fully globalized in terms of culture, philosophy, and impart students with the ability to confidently deal in international affairs. This means that Chinese students can get some kind of training and exposure without having to attend universities overseas in countries like UK, USA and Australia.

The Nottingham-Ningbo University will have about 4,000 students who will primarily study business and social sciences. The Vice-Chancellor of the new university is Professor Yang Fujia, currently dean of the University of Nottingham and academician of the Chinese Academy of Sciences. Doctor Ian Gow, current deputy president of the

[3] http://english.people.com.cn/200403/25/eng20040325_138422.shtml

[4] Sean Coughlan, *UK University to open in China, BBC News Online,* March 24 2004

University of Nottingham and dean of its business school, will be the managing deputy president of Ningbo-Nottingham University. Professor Yang was a ZWU guest who and played an important role in the creation of the new university; Nottingham failed to establish desired partnerships with other universities in China, having had discussions with Fudan and Tongji universities in Shanghai and with Tsinghua University in Beijing.

The new university is supported both by Ningbo City and the Zhejiang provincial government. The Ministry of Education will assess the results after three years and promote a number of similar universities if found to be successful. The Ningbo-Nottingham University has already recruited 260 students who started their education in the autumn of 2004.

Another interesting university development originates in Ningbo although located in Beijing. Geely University, named after its investor, the Geely Group, was originally a college set up by the group at a cost of RMB50 million to train its own workers. A deal to conduct the training through an existing college came to naught in Hangzhou. Its application to set up a school in another Zhejiang city was rebuffed when the local authority liked its idea so much that they decided to open their own school. Geely University was finally opened in Beijing in 2000. The first year enrolment was 3,000-4,000 students while the second year saw a big jump to 7,000-8,000.

Beijing Geely University (BGU), approved by Beijing Municipal Government and registered by the Ministry of Education of China in 2001, is an international and new type of higher education institute qualified to issue graduation certification and diplomas. It is located in Beijing Zhongguancun Chang Ping Science and Technology Park, close to the Olympic Village now being constructed. Meeting requirements in social economic development, BGU has established 14 colleges and schools, including Business School, Information and Technology College, Journalism and Communication College, and Finance and Security College.

3. Development Zones

Ningbo has four national-level development zones[5], one hi-tech zone and 10 provincial and municipal level development zones which cater to shipping and trade sectors, as well as hi-tech sectors. The state-level zones include the Ningbo High-tech Industry Park (NHTID), the Ningbo Economic & Technical Development Zone (NETD), Ningbo Free Trade Zone, and Ningbo Export Processing Zone. They are all located at Eastern Ningbo, within the maritime region.

Ningbo Economic and Technological Development Zone (NETDZ) was established as a state-level development zone in 1984 pioneered by the special zone in 1979, followed by Hainan in 1988 and Shanghai in 1990. Altogether there are presently 43 state-level development zones as well as a large number of provincial-level development zones.

[5] Ningbo is one of five cities under the direct jurisdiction of the State Council, enjoying the same rights as those of provincial governments in terms of economic planning and management.

Apparently there are too many zones, thus creating too much competition. The Ningbo Municipal Government in 2003 decided to merge the Beilun district with NETDZ. The Zone employs 380,000 people.

NETDZ is the largest development zone in Ningbo, with GDP of over USD 1.2 billion. After its opening in 1984 many multinational companies have already established a presence in NETDZ. By July 2002, 686 enterprises had settled in NETDZ from nearly 30 countries and regions with accumulated FDI of USD 2.1 billion.[6] Major industries include power generation, chemical, stainless steel shipbuilding, paper manufacturing, plastic and rubber, and high-tech industries.

4. Ningbo High-tech Park

The Ningbo Hi-Tech Park (NHT Park) is the only hi-tech zone in the region. It was jointly developed by (CAS) and the Ningbo Municipal Government, and opened in July 1999. Major products include computer motherboards, network terminals, IC components, software serial, photoelectric apparatus, light-reflecting material, plasma display panels and simulators. The ambitious future is stated in the following words.

> Ningbo Hi-tech Park provides the best choice for enterprising talents. The Ningbo Hi-tech Park will, by the end of the 10th Five-year Plan, have expanded into an incubation base of 30,000 square meters floor space, 1,000 incubation enterprises with over 10,000 top talents. This includes: 1. Ningbo Hi-tech Park Pioneering Centre; 2. Returned Overseas Students Innovation Park; 3. Postdoctoral Workstation; 4. Zhejiang Postdoctoral Pioneering Base (Ningbo); 5. Ningbo Doctoral Pioneering Park; 6. Undergraduate Pioneering Park; 7. Ningbo Sub-park of Zhejiang University High-tech Park; and 8. Ningbo Su-institute of Zhejiang University Software and Network Institute.
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> The emphasis will be in three key fields: micro-electronic and software, optical and telecommunication industries. Accordingly, the aim is to establish the Ningbo Micro Electronic Science and Technology Park, the Ningbo Software Science and Technology Park and the Ningbo Optical and Telecommunications Science and Technology Park – with one hundred ratified hi-tech enterprises by 2005[7].

A number of factors contributed to the creation of the NHT Park. First, Ningbo offers geographically and market-wise a very attractive location. Second, CAS did not have any major facilities in Zhejiang province. Third, Ningbo has a very good track record of private entrepreneurship. In a certain way it shares similarities with Taiwan's Hsinchu Industrial Science Park.

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[6] 16 of the top 500 multinational companies have set up ventures here, including Esso, Dow Chemical, Mitsui, Mitsubishi Itochu, Marubeni, Asashi Chemical, Kanematsu, Sumitomo, Iwai, Hoechst, Mannesman and Samsung.

[7] Ningbo High-tech Park, Brochure

Fourth, the educational level had been rather low in Ningbo which could be raised through new initiatives. Fifth, more than 80 CAS staff have their origin in Ningbo, constituting a factual and very powerful lobby.

There is expectation of a rapid growth of software development. Zhejiang University will establish a Software Institute in October 2004. Ningbo is expected to attract a large number of software companies with an expected employment of more than 30,000.

The Innovation Centre of the NHT Park was established in late 1999, and in October 2002 named National High Tech Centre by the Minister of Science and Technology, Xu Guanha. In March 2003, CAS and Ningbo Municipal Government signed the agreement to jointly build up the Hi-tech Industry Incubation Base of Chinese Academy of Science (Ningbo). It will integrate CAS talents and technology with the advantages of Ningbo in terms of location and industrial policy, in order to accelerate the industrialization of scientific research results. The Innovation Centre incorporates six major activities[8]. See appendix. It also has another two innovation parks which will, in particular, support university innovations.

Each county, and county city districts in Ningbo all have their own municipal-level incubator, although together much smaller than the innovation Centre within the NHT Park. See appendix. There also exist incubators at the provincial level in Zhejiang.

More than 200 enterprises have been introduced to the Innovation Centre including what is referred to as research institutes. This activity has involved more than 3,600 staff of whom 150 were PhD degree holders and another 90 overseas Chinese. The Innovation Centre presently has 270 member enterprises of which 75 are physically present in the Centre building while the rest are virtual members. Ten enterprises will graduate in 2004 and establish start-up companies. Some 30 enterprises have already established Research and Development facilities which may have good prospects for future business. Seven have been approved for “graduation”. See appendix.

[8] Ningbo Hi-Tech Innovation Centre (brochure): “Technology Global – Innovation Local”, Ningbo 2003 (?)

Appendices

1. INSTITUTIONS OF HIGHER LEARNING IN NINGBO CITY

Institution	Supervision	Number of Fulltime Students		Annual Enrolment	Date of Establishment
		Normal education	Adult University		
1. Ningbo Vocational & Technical College	Ningbo Municipal Government	5,523	5,522	2,,500	1959
2. Zhejiang Light Industrial & Textile College	Ningbo Municipal Government	3,034	692	1,700	1979
3. Ningbo Radio & TV University	Ningbo Municipal Government	1,828	1,347	1,500	1979
4. Ningbo Engineering College	Ningbo Municipal Government	6,978	2,661	2,500	1983
5. Ningbo Teachers' College	Ningbo Municipal Government		7,892	2,500	1984
6. Ningbo University	Ningbo Municipal Government, provincial & municipal level	21,807	13,268	6,500	1985
7. Public Security & Maritime Police College	Ministry of Public Security,	1,029	779	500	1999
8. Zhejiang Pharmaceutical College	Zhejiang Provincial Government	4,368	73	1,800	1999
9. Zhejiang Wanli University	Ningbo Municipal Government	14,341	1,548	5,500	1999
10. Zhejiang Business Technology Institute	Zhejiang Provincial Government	5,099	1,049	2,000	2001
11. Ningbo Institute of Technology (Zhejiang University)	Zhejiang Provincial Government	6,942	607	3,000	2001
12. Ningbo Dahongying Vocational Technical College	Ningbo Municipal Government	3,810	239	3,500	2001
13. Ningbo Garment Vocational College	Ningbo Municipal Government	3,607	176	1,700	2002
14. Ningbo City Technology College	Ningbo Municipal Government	1,520		2,500	2003
15. Ningbo Tianyi Vocational & Technical College	Ningbo Municipal Government			1,500	2004

Source: Data provided by Ningbo Municipal Foreign Trade & Economic Cooperation Bureau

2. INDUSTRIAL PARKS IN NINGBO

Industrial/Technology Park	Jurisdiction	Features
1. Ningbo Hi-tech Industry Park	Ningbo/Nation	Electronics, telecommunications
2. Ningbo Economic & Technical Development Zone	Ningbo/Nation	Petrochemicals, steel, automobile accessories, electronics, IT, precision machinery and bio-pharmacy
3. Ningbo Export Processing Zone	Ningbo/Nation	
4. Ningbo Free-Trade Zone	Ningbo/Nation	IT industry and electronics
5. Beilun High-tech Industry park	Beilun district/Ningbo	Automobile accessories, stationery and casting moulds
6. Zhenhai Economic Development Zone	Zhenhai district/Ningbo	Precision machinery and fine chemicals
7. Cixi Economic Development Zone	Cixi county city/Ningbo	Metals, machinery, plastics, electric appliances and textiles
8. Yuyao Economic Development Zone	Yuyao county city - Ningbo	Household electric appliances, plastics and plastic moulds
9. Yinzhou Industrial Park	Yinzhou district/Ningbo	Garments, machinery and automobile accessories
10. Xiangshan Economic Development Zone	Xiangshan county - Ningbo	Knitwear, aquatic processing, casting moulds, and tourism
11. Fenghua Economic Development Zone	Fenghua county city - Ningbo	Garments, eco-agriculture and tourism
12. Ninghai Economic Development Zone	Ninghai county/Ningbo	Plastics, moulds, stationery and aquaculture
13. Jiangbei Industry Park	Jiangbei district	Machinery and services
14. Haishu High-tech Industry Park	Haishu district	Commerce and consultancy services
15. Ningbo Daxie Development Zone	Daxie/Ningbo	Energy, storage and transport services
16. Dongqian Lake Tourist & Holiday Resort	Dongqian/Ningbo	Tourism and recreation

Source: Ningbo Today – An Investor's Guide, Ningbo Foreign Investment Development Board

3. NINGBO INNOVATION CENTRE – MAJOR ACTIVITIES

1. **Ningbo Software Park** was officially founded in April 2000 upon the approval of the Ningbo Municipal Government. It is mainly engaged in developing system software, multi-media software, intelligence software, office management software and network application software and etc. which is one of the leading software industrialization bases of Ningbo.

2. **Zhejiang Provincial Postdoctoral Innovation Base (Ningbo)** was established in May 2002 with the approval of Zhejiang Personnel Bureau; it was jointly developed by the Administrative Committee of Ningbo Hi-tech Park and Zhejiang Provincial Postdoctoral Sodality. It will provide all-round qualified service for those with postdoctoral degree who were there to start their own business.

3. **Ningbo Doctoral Innovation Park** is the first doctoral incubator of Zhejiang Province, co-established in January 2001 by the Administrative Committee of Ningbo Hi-tech Park, Ningbo Doctoral Association and Ningbo Science and Technology Bureau, providing possibilities for Chinese doctors, overseas or at home, to commercialize products.

4. **Ningbo Overseas Scholars Innovation Park** was founded in February 2001 to offer a qualified service platform for returned overseas scholars. The park promotes the combination of advanced technologies and managerial experiences abroad with internal resources.

5. **Ningbo Undergraduate Innovation Park** was co-founded by the Administrative Committee of Ningbo Hi-Tech Park, Ningbo Science and Technology Bureau, Ningbo Education Bureau, Ningbo University and Ningbo Polytechnic College of Zhejiang University, Zhejiang Wanli College and Software Faculty of Zhejiang University in March 2002. Its main purpose is to offer a public platform for undergraduates, postdoctoral and young teachers of Ningbo Colleges to match knowledge with capital and promote the commercialization of their achievements.

6. **Chinese Information and Science Computing Internship and Innovation Base** was established by the Chinese Computing Mathematic Association, the Administrative Committee of Ningbo Hi-tech Park and the Information Office of Ningbo Government in October 2002. Aiming to take full advantage of technologies, intelligence and equipment of the above-mentioned founders respectively, it will play an important role in strengthening communication and co-operation of information – and science computing-oriented talents home and abroad and boosting the informatization of Ningbo.

4. INCUBATORS IN NINGBO

Centre Name	Date of Establishment	Number of incubating companies	Number of "graduated" companies
1. Ningbo Science & Technology Innovation Centre	May 1999	221	10
2. Ningbo Freeport District Overseas Pioneer Service Centre	September1999	40	8
3. Ningbo Development Zone Science & Technology Innovation Service Centre	July 2000	48	3
4. Jiangbei Science and Technology Innovation Service Centre, Ningbo	October 2000	27	3
5. Zhenhai Science & Technology Innovation Service Centre	October 2000	37	3
6. Cixi Productivity Centre	October 2001	13	1
7. Beilun Modern Agricultural Comprehensive Development Zone	October 2002	5	2
8. Jiangdong Science & Technology Innovation Service Centre, Ningbo	November 2002	48	11
9. Haishu Science & Technology Innovation Centre	April 2003	11	0
10. Xiangshan Science & Technology Innovation Centre	May 2003	14	3

Source: Data provided by Ningbo Municipal Foreign Trade & Economic Cooperation Bureau (End of 2003 for all the data)

5. INNOVATION CENTRE OF THE NHT PARK - ENTREPRENEUR DIRECTORY

Enterprises marked in bold have graduated and are ready to become start-up companies, and those marked in italics are research companies (research institutes)

	Name	**Product Range**
1.	**Cybics (Ningbo) Software Co., Ltd.**	**Software Development**
2.	Hefei Chengong Software Co., Ltd. (Ningbo)	Software Development
3.	CAS Software R&D Institute, Ningbo Branch	Software Development
4.	Ningbo Xinhua Information & Technology Co., Ltd.	Software Development
5.	**Ningbo Zhongci Computer Software Co., Ltd.**	**Software Development**
6.	Ningbo ChinaWebs Network Co., Ltd.	Software Development
7.	**Ningbo Echo Software Co., Ltd.**	**Software Development**
8.	Ningbo Seawall Data Processing Technology Co., Ltd.	Software Development
9.	Ningbo Hi-tech Park Leabon Software Co., Ltd.	Software Development
10.	Ningbo Hi-tech Park Xigema Electronic Co., Ltd.	Software Development
11.	National CAD Supporting Software Engineering Research Centre	Software Development
12.	**Ningbo Rouse Kexiang Intelligent Technology Co., Ltd.**	**Intelligent Technology**
13.	Ningbo Hi-tech Park Yongjing Micro-electronic Co., Ltd.	IC Research
14.	**Ningbo Dongyinghe Electronic Co., Ltd.**	**Intelligent Technology**
15.	Ningbo Daze Information Technology Co., Ltd.	Tele-Communication Equipment
16.	*National Industrial Automatization Engineering Research Centre of Zhejiang University, Ningbo Branch*	Automatization Research
17.	Ningbo Digital City Information Technology Co., Ltd.	GIS
18.	Ningbo Redlucky Communication Equipment Co., Ltd.	Tele-communication Product
19.	Ningbo Hi-tech Park Yitian Technology Co., Ltd.	Tele-communication Equipment
20.	Ningbo Daning Tele-communication Technology Co., Ltd.	CDMA
21.	Ningbo Keyuan Sensor Engineering Co., Ltd.	Intelligent Sensor
22.	NHY Controller (Ningbo) Co., Ltd.	Micro-controller
23.	*Ningbo Sanian Metro-electronic Institute*	Industrial Automatization
24.	Ningbo Wise Digital Technology Co., Ltd.	Digital Camera
25.	**Ningbo Jiyuan Machinery Co., Ltd.**	**Mechanical Engineering**
26.	Ningbo Youhe New Source Co., Ltd.	Microwave Sulfur Lamp
27.	***Ningbo Hi-tech Park Xinte Transformer Institute***	**Specialized Transformer**
28.	Ningbo North Industrial Technology Co., Ltd.	Technology Development
29.	Ningbo Ruixin Biotechnology Co., Ltd.	Bio-chip
30.	Ningbo Chemical & Pharmaceutical Intermediates Co., Ltd.	Medicine Research
31.	Ningbo Soutu Environment Engineering Co., Ltd.	Environmental Equipment
32.	Ningbo Tianyi Civil Engineering & Technology Co., Ltd.	Interior Environment Supervision

Source: NHT Park Brochure

6. RESEARCH INSTITUTES IN NINGBO – EARLY ESTABLISHMENT

Institute	Year of Establishment	Number of Researchers
Ningbo Research & Design Institute of Chemical Industry	1958	64
Ningbo Environmental Protect Science Design and Research Institute	1958	39
Ningbo Research Academy of Agricultural Sciences	1958	55
Ningbo Institute of Agricultural Machinery Research	1959	9
Ningbo Mechanical Electric Design & Research Institute	1970	113
Ningbo Design & Research Academy of the Second Light Industry	1973	40
Ningbo 3D Display Technology Research Institute	1977	23
Ningbo Institute of Medical Sciences	1977	9
Ningbo Institute of Science & Technology Information	1978	28
Ningbo Fisheries Research Institute	1978	26
Ningbo Electric Technology Research Institute	1979	14
Ningbo Institute of Microcirculation and Henbane	1987	18
Ningbo Research Institute for Exploitation of the Sea	1998	26
Zhouzhou Electric Locomotive Research Institute Ningbo Branch	1990	38
China Ordnance Science Research Institute, Ningbo Branch	2000	722

Source: Data provided by Ningbo Municipal Foreign Trade & Economic Cooperation Bureau

7. NINGBO OUTSTANDING ENTERPRISES - VTE (VILLAGE & TOWNSHIP ENTERPRISE) & PRIVATE

The Geely Group

The Geely Group, well-known for its recent entry into the Chinese automobile market with its low-cost cars, has its origin as a parts maker for refrigerators in 1986. Three years after its establishment, Geely entered into the production of advanced decoration material industry and manufactured the first magnalium bent board in China in 1989. In April 1992 Geely went into the manufacture of motorcycles. In 1997 the company introduced the first scooter in China and decided to enter into the automobile industry the same year. On August 8, 1998 the first Geely car was manufactured in Linhai City, Zhejiang Province.

The Geely Group includes a number of enterprises mainly within the field of auto and motorcycle manufacture. The Group operates two non-governmental universities, one in Linhai, Zhejiang province and the other in Zhongguanzun in Beijing. They have an enrolment of 3,500 and 20,000 respectively. The Group also includes hotels and resort inns as well as factories producing decorative materials. The Group has invested in Shanghai Metop International Trade Co., Ltd. that primarily serves as the export marketing instrument for Geely cars. Geely is producing 150,000 cars in 2004 in plants that have an annual capacity of 200,000 and expandable to 600,000 annually.

Ningbo Bird

The present Bird has its origin in October 1992 when five engineers who were fresh graduates from various universities – the three from Xinan Jiaotong University embarked on the manufacture of pagers without any funds; after many failed attempts to bring in investors the trio managed to secure the support of the Fenghua Government. Subsequently, the five engineers who were then working in different businesses moved to Fenghua County in Ningbo. They spent several months developing samples of pagers that proved to be functional but not durable. The development for marketable products took another three years and by then employment had grown to 200 and supported by the local government throughout the entire duration.

The company in 1997 experienced a breakthrough and sold 350,000 pagers which gave a revenue of RMB180 million. The following year saw an increase to one million pagers and a revenue of RMB500 million. The company foresaw that pagers were losing the advantage and decided to expand into another but related direction. By then the local government through its SOEs had invested 45% of the company’s capital with another 44% from the accumulated capital of the five founders, and the remainder from other companies. The decision to move into handset manufacturing was taken in 1988 and the

company managers realised that success depended on access to capital and technology. Subsequently the company was listed on the Shanghai Stock Exchange in July 2000 which brought RMB600 million in new capital. In the meantime the company had been discussing with various partners and in spring 1999 reached an agreement with Sagem in France. In that year Bird produced 100,000 units of handsets with a revenue of RMB1,100 million while still manufacturing pagers. The official licence to manufacture handsets was officially granted by the government in 1999. In the following year Bird abort the manufacture of pagers to concentrate on handsets and the production reached several hundred thousands. Since then production has rapidly expanded - 20 million were expected in 2004 with Bird becoming the number one producer in China, followed by TCL Communications Equipment Co., Ltd.

Handsets make up 99% of the company's production with system products – repeaters – making the remaining one per cent. Handsets will remain important but the company is looking for new possibilities, as high growth rates cannot continue forever. When growth rate levels out, it will be necessary to find new products, although basically all R&D is still concentrated on handsets.

Bird employs some 9,000 sales people. These include 5,000 who work in Bird's sales units and in after-sales services and another 4,000 who are indirectly employed by retailers. TCL relies more on retailers while Bird has many more sales outlets that are directly controlled

Bird has in technological development greatly benefited from its relationship with Sagem, a relationship which also has been very beneficial to the French company, as it is not only receiving royalty but also selling components to Bird. In 2001 the company started to develop its own models; it has been a gradual process with no more than 30 models developed per year by Bird.

There is no doubt that the profit margin for handsets will come down and that will force the foreign manufacturers to withdraw as their costs are much higher, not at least in the sales network. Furthermore, with lower costs and high quality Bird and other handset manufacturers in China will go abroad. In 2002 Bird exported 200,000 handsets to Southeast Asia and to Sagem to be distributed separately. Exports are expected to reach 1,000,000 in 2003 with targets in Southeast Asia, India and Russia. Bird will gradually expand into Russia where it had previously distributed its pagers.

Ningbo Haitian Machinery

The present Haitian Machinery Co., Ltd. was founded in 1966 as a VTE. It has become a leading manufacturer of plastic moulding equipment in China after having started as a nameless small village mill. It has eventually grown to become the largest plastic machinery supplier in China with a current staff strength of more than 1,800. It has a large customer base not only in China but the international market, having delivered its equipment to more than 50 countries, including the US, UK and Australia.

Haitian was a VTE until 1997 when the company was converted to a shareholding company, with some shares held by the government. Haitian has collaborated with Demag in Germany to provide advanced technology for Haitian's development of machines, a relation that has provided the basis for the joint venture Demag-Haitian. The resulting advantage is that Haitian has been able to acquire the most advanced production technology, including management, while Demag through Haitian has been able to enter into Haitian's marketing network both in China and abroad. This has made it possible to introduce Enterprise Resource Planning (ERP) management software and Office Automation system which has increased operational efficiency and saved costs. Haitian today has a complete national sales network as well as a global sales network; it maintains service centres in Hong Kong, Indonesia and Turkey.

Haitian in 2002 delivered 7,000 presses of which 20-25% are exported. The production in 2003 reached 10,000 machines; it is today a world leader in plastic moulding equipment.

Haitian set up a R&D Centre for plastic machinery in 2000. The centre, which is manned by 15 staff, complements a technology department of 100 staff, set up earlier to handle technology development.

The projected production of 10,000 machines in 2003 was expected to be followed by a further increase in 2004 – to reach a production of 13,000. In early years the moulding machines were extensively used for producing parts for TV sets and other household products. The demand has today shifted to the automobile sector and to the IT industry where plastics and multi-material components are extensively used.

8. MOULD CLUSTER IN NINGBO - EXAMPLES OF ENTERPRISES

Company	Ownership	Employees	Main Product	Established
1. Ningbo Yeong Yang Technology Co., Ltd.	Foreign-funded Enterprise	500	Computer engine box, electrical source, server box, mould development, IA home electric box, and other hardware and software manufacturing and production, international trade, exporting and process, bonded storage	1978
2. Ningbo Jintai Machine Mould Co., Ltd.	Share-holding JV	250	Die-casting mould, low die-casting mould, vacuum pump, water pump, valve, mould-melt precise mould, motor casting mould, swage crank mould, and others casting moulds	1984
3. Ningbo South Mould & Plastic Co., Ltd	Non-government Enterprise	100	Middle and big-sized precision plastic injection mould, die-casting mould and stamping moulds and also produces electrical appliances parts, automotive parts, electrical instruments and plastic furniture	1986
4. Ningbo Yue Fei Mould Company Limited	Non-government Enterprise	150	Medium, accurate, complicated, durable mould used in various vehicles, electronic appliances and motors	1987
5. Ninghai Dapeng Mould & Plastic Co., Ltd.	Non-government Enterprise	115	Household appliance and automotive parts	1993
6. Xiangshan Tong Jia Casting and Mould Co, Ltd.	Non-government Enterprise	160	Auto casting, die-casting and gravity typecast mould such as engine crock body, lip and lateral pipe	1996
7. Ningbo Beifa Group	Foreign-funded Enterprise	4000	Gel ink pen, ballpoint pen, roller pen, highlighter, permanent marker, board marker, mechanical pencil and multi-functional pen.	1996
8. Ningbo Haitai Machinery (Group) Co, Ltd.	Non-government Enterprise	520	Plastering machine, metal die-casting machine tool, high-tech products integrated with light, machine and electrics, precision mould and slap-up plastic goods	1998
9. Ningbo Far-east Mould-making Co.,	Non-government Enterprise	170	Design and making of large precision moulds to produce	1999

Ltd.			plastic articles	
10. Ningbo Shengji Machine Mould Co., Ltd.	Non-government Enterprise	118	Electric utility parts, automobile water pump, telecom hardware, electric iron plastic mould	2002

Source: Data provided by Ningbo Municipal Foreign Trade & Economic Cooperation Bureau